

GUJARAT TECHNOLOGICAL UNIVERSITY
ME - SEMESTER-II • EXAMINATION – SUMMER • 2014

Subject Code: 1723102**Date: 18-06-2014****Subject Name: Advanced Biomedical Imaging****Time: 02:30 pm - 05:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a)** Give difference between Digital X-ray vs. Film X-Ray. **07**
 Also mention advantages of Digital X-Ray.
- (b)** Enlist and explain various applications of scintigraphy. **07**
- Q.2 (a)** Enlist and explain the causes of Artifacts in PET scanning. **07**
- (b)** Explain the application of SPECT for Detection of Neurological Diseases. **07**
- OR**
- (b)** Enlist the applications of thermal imaging technique in medical imaging. **07**
 Describe any three in detail with block diagrams.
- Q.3 (a)** Briefly describe Digital radiographic system. **07**
- (b)** Describe the third, fourth and fifth CT generations. **07**
- OR**
- Q.3 (a)** Explain instrumentation of CT scan system with schematic block diagram. **07**
- (b)** Explain slice select gradient for MRI. How to change the slice thickness? **07**
- Q.4 (a)** Describe various applications of photoacoustic imaging. **07**
- (b)** Explain spatial resolution and contrast resolution with appropriate examples. **07**
- OR**
- Q.4 (a)** Explain back projection and filtered back projection algorithms with necessary diagrams. **07**
- Q.4 (b)** What are the major challenges in PAT scan? Explain the reconstruction techniques. **07**
- Q.5 (a)** Enlist and explain the properties of magnetic particle. **07**
- (b)** Write a brief note on Gamma Camera. **07**
- OR**
- Q.5 (a)** What are the limitations of magnetic particle imaging? **07**
- (b)** Compare the number of visible light photons emitted by a calcium tungstate screen with the number emitted by a gadolinium oxysulfide screen. Assume that 100 x-ray photons, each having an energy of 30 keV, strike the screen. The following data are given: **07**

| | <i>Calcium Tungstate</i> | <i>Gadolinium Oxysulfide</i> |
|-----------------------------|--------------------------|------------------------------|
| Absorption (%) | 40 | 60 |
| Conversion (%) | 5 | 20 |
| Spectral emission peak (nm) | 420 | 550 |
